

Peridynamic Modeling of an Isotropic Plate under Tensile and Flexural Loading

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Abstract : Peridynamics is a new modeling concept of non-local interactions for solid structures. The formulations of Peridynamic (PD) theory are based on integral equations rather than differential equations. Through, undefined equations of associated problems are avoided. PD theory might be defined as continuum version of molecular dynamics. The medium is usually modeled with mass particles bonded together. Particles interact with each other directly across finite distances through central forces named as bonds. The main assumption of this theory is that the body is composed of material points which interact with other material points within a finite distance. Although, PD theory developed for discontinuities, it gives good results for structures which have no discontinuities. In this paper, displacement control of the isotropic plate under the effect of tensile and bending loading has been investigated by means of PD theory. A MATLAB code is generated to create PD bonds and corresponding surface correction factors. Using generated MATLAB code the geometry of the specimen is generated, and the code is implemented in Finite Element Software. The results obtained from non-local continuum theory are compared with the Finite Element Analysis results and analytical solution. The results show good agreement.

Keywords : non-local continuum mechanics, peridynamic theory, solid structures, tensile loading, flexural loading

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